



# FM Measurement Demodulator FS-K7

for Spectrum Analyzer FSP

FM Measurement Demodulator for Spectrum Analyzer FSP for determining analog modulation parameters.

## Display

- ◆ Frequency modulation (FM) or carrier power as a function of time
- ◆ RF spectrum (FFT)
- ◆ Table with numeric values for peak and RMS deviation, modulation frequency (AF), carrier offset, carrier power

## Features

- ◆ Digital measurement demodulator with wide bandwidth range from 12.5 kHz to 10 MHz
- ◆ Restoration of sampled signal with high measurement accuracy
- ◆ Ideal for production and development of *Bluetooth*<sup>™</sup> modules
- ◆ Great memory depth for long measurement sequences (I/Q memory 2x 128 ksamples)

# FSP as FM Measurement Demodulator

## Characteristics

Option FS-K7 adds FM demodulation to the functions of Spectrum Analyzer FSP.

The universal characteristics of the digital measurement demodulator open up a wide range of applications, e.g. measurements of synthesizer settling or frequency deviation. This makes FSP with option FS-K7 ideal for measuring modulation characteristics such as those required in the development and production of *Bluetooth* modules.

The measurement results can be subsequently displayed as

- ◆ Frequency (FM) or carrier power versus time or as an
- ◆ RF spectrum (FFT)

The main modulation parameters such as frequency deviation (peak, RMS), modulation frequency or carrier power are also numerically indicated in a table.

The sampled signal is restored and the signal is displayed in its original form. The sampling rate is automatically matched to the demodulation bandwidth.

Sequences with a length of up to 8.3 s (demodulation bandwidth 12.5 kHz) or 65 ms (demodulation bandwidth 1.6 MHz) can be recorded in the large I/Q memory of the FSP. This allows long bit sequences, such as occur with *Bluetooth* signals, to be completely investigated. The demodulated data can also be read out via GPIB, RS-232-C or LAN and processed on an external PC.

The FM and RF level trigger function with a wide dynamic range provides special trigger capabilities. This also allows signals to be tested for which no external trigger signal is available.

## Measurement examples

### **Bluetooth modulation characteristics**

The frequency deviation of the signal is determined for a specified bit sequence (...1111 0000... or 10101010...) and displayed as a measured trace and in numerical form. (Fig. 1)

### **Transient response of synthesizer**

With the FM measurement demodulator function, the transient response of a synthesizer can be measured in digital communication systems like GSM or *Bluetooth* transmitters. (Fig. 2)

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Certified Environmental System

**ISO 14001**  
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**ISO 9001**  
DQS REG. NO 1954



*...making the right connections.*

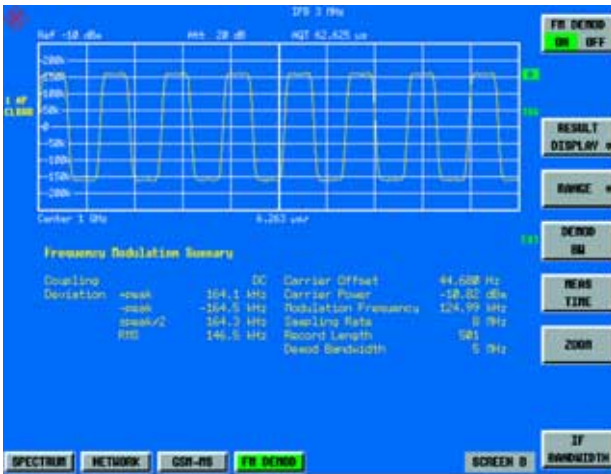


Fig. 1: Modulation characteristics of a Bluetooth signal

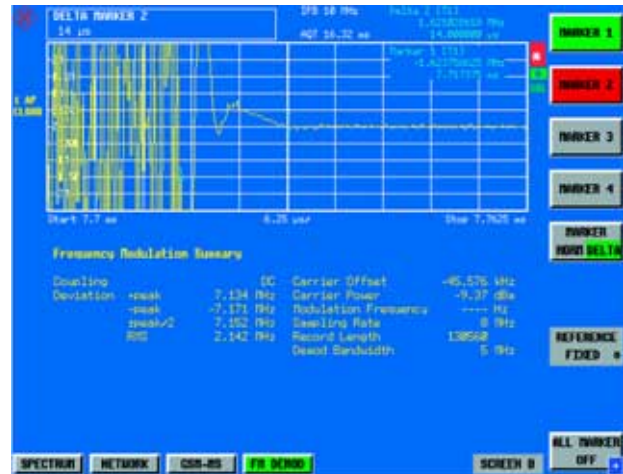


Fig. 2: Transient response of synthesizer

## Specifications

### Measurement of analog modulation signals

Demodulation bandwidth	12.5 kHz to 10 MHz
Max. record time	
Demod. bandw. ≤1.6 MHz	≥85 s/(demod. bandwidth/kHz)
Demod. bandw. > 1.6 MHz	≥34 s/(demod. bandwidth/kHz)
Readout	trace with frequency or RF power versus time, RF spectrum and table with numerical display of: peak and rms values of deviation, modulation frequency, carrier offset, carrier power (power of unmodulated carrier)

### Frequency demodulation

AF	DC to 5 MHz ( max. 0.5 x demod. bandwidth)
Deviation range	5 MHz (max. 0.5 x demod. bandwidth)
Deviation uncertainty	
AF + dev. ≤0.5 x demod. bandw. and AF ≤0.1 x IF bandwidth	<3% of result + residual FM

### Residual FM <sup>1)</sup>

Demodulation bandwidth ≤200 kHz, rms	
RF ≤1 GHz	80 Hz, typ.
RF >1 GHz	80 Hz x √(f/1 GHz), typ.

<sup>1)</sup> RF input level ≥(reference level/dBm -10) dBm and  
RF input level ≥(RF attenuation/dB -30) dBm.

### Carrier power versus time

AF	DC to 5 MHz (max. 0.5 x demod. bandwidth) noise floor to +30dBm
Display range	
Max. dynamic range	
Demod. bandwidth 200 kHz	75 dB, typ.
Display nonlinearity	
S/N >16 dB	0.2 dB, typ.
Incidental AM with FM	
AF + dev. ≤0.5 x demod. bandw. and deviation ≤0.1 x IF bandwidth	0.1 dB + residual AM, typ.

### Unmodulated carrier power

Measurement uncertainty	
S/N >16 dB, RF=50 kHz to 3 GHz	1 dB, typ.

### AF

Range	≤5 MHz (max. 0.5 x demod. bandwidth)
Resolution	5 digits
Uncertainty	0,1 %

### RF spectrum

Span	12.5 kHz to 10 MHz
Resolution bandwidth (FFT filters)	1 Hz to 10 MHz
Shape factor 60:3 dB	2.5 nominal

## Order information

FM Measurement Demodulator for FSP FS-K7

1141.1796.02



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